



INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

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| <p style="text-align: center;">(10)</p> <p>(54) Title: ELEVATING APPARATUS</p> | | | |
| <p>(57) Abstract</p> <p>Elevating apparatus is provided which includes first carriage means (11) and second carriage means (12), track means (13) adapted to support said first carriage means (11) and adapted to be mounted on a platform (14) for horizontal movement of said first carriage means (11) from a stored position on the platform (14) remote from its free edge (16) to an upper loading position overlapping said free edge, said second carriage means (12) being supported operatively by said first carriage means (11) and mounted for vertical movement relative thereto when said first carriage means is in said upper loading position, whereby said second carriage means (12) is transferable from said upper loading position to a lower loading position at or adjacent the ground or other base level means.</p> | | | |

+ DESIGNATIONS OF "SU"

Any designation of "SU" has effect in the Russian Federation. It is not yet known whether any such designation has effect in other States of the former Soviet Union.

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ELEVATING APPARATUSTECHNICAL FIELD

THIS INVENTION relates to elevating apparatus, and it has particular but not exclusive reference to such apparatus for raising and lowering articles to and from a rigid support platform, such as the moving of a wheelchair into and out of a van-type vehicle.

BACKGROUND ART

While many different types of elevating apparatus have been devised in the past for use with an automotive vehicle, such as a van, to load and unload a disabled person in a wheelchair, I have not to date found an example exhibiting all the desired characteristics of safety, reliability, cheapness and ease of operation. Thus, it is a principal object of my invention to provide novel lifting apparatus for this purpose, which will exhibit the aforementioned desiderata, while at the same time being usable for other elevating purposes in different circumstances and applicable to any range of articles as well as wheelchairs. Other objects and advantages of the invention will be hereinafter apparent.

DISCLOSURE OF THE INVENTION

With the foregoing and other objects in view, my invention resides broadly in elevating apparatus including first carriage means and second carriage means, track means adapted to support said first carriage means and adapted to be mounted on a platform for horizontal movement of said first carriage means from a stored position on the platform remote from its free edge to an upper loading position overlapping said free edge, said second carriage means being supported operatively by said first carriage means and mounted for vertical movement relative thereto when said first carriage means is in said upper loading position, whereby said second carriage means is transferable from said upper loading position to a lower

loading position at or adjacent the ground or other base level means.

Very many alternative design arrangements may be employed within the broad idea or concept set out above. For example, the horizontal track means may include a pair of spaced parallel tracks extending between said stored and upper loading positions, said first carriage means being mounted on guide rollers or equivalent means engaging said parallel tracks in guided relationship thereto. It is preferred that the tracks be secured to a motor vehicle van floor for loading and unloading through a door thereof, such as the rear door of a van, such rear door being of a height to accommodate a loaded wheelchair for example, the latter being accommodated within the van in stored attitude when the first carriage means occupies the innermost or stored position.

It is preferred that the second carriage means be mounted so that it can travel vertically relative to the first carriage means between upper and lower loading positions when the carriage means is furthest from the stored position, guide means being associated with the first carriage means to co-operate with rollers or other guide means on upstanding frame members of said second carriage means. Suitably the said upstanding frame members of said second carriage means are raisable in guided manner relative to upper guide channel members which are themselves raisable in guided manner relative to and within fixed channel assemblies on said first carriage means, power means being provided for lifting the guide channel members and their supported lower upstanding frame members in a two-stage telescopic-type action enabling the fixed channel assemblies on the first carriage means to be made to a height not substantially exceeding the designed lifting height of the said upstanding frame members.

When used for wheelchair transport, the second

carriage means of the elevating apparatus will have its upstanding frame members connected at their lower extremities to a horizontal floor plate assembly adapted to support the wheelchair to be lifted. It is preferred that the floor plate assembly be provided with an entry gate adapted to be lowered to permit the wheelchair to be driven thereon or raised to prevent accidental removal therefrom, said gate being mounted for pivotal movement about a horizontal axis between lower and raised positions by lever means adapted to be locked by over-centre toggle means when the gate is raised. The floor plate may suitably be provided also with an adjustable safety gate towards its front remote from the entry gate.

Thus, a disabled person in a wheelchair may drive onto the floor plate, whereafter the wheelchair may be secured in position, and then the second carriage means may be raised by electric power relative to the first carriage means until they are both in the extended upper loading position, whereafter both carriage means can be moved slidably in unison to take the wheelchair to its stored position. Other features of the invention will become apparent from the following description of a preferred embodiment.

BEST METHOD OF CARRYING OUT THE INVENTION

In order that the invention may be more readily understood and put into practical effect, reference will now be made to the accompanying drawings wherein:-

Fig. 1 is a perspective view of the rear of a motor vehicle van fitted with elevating apparatus according to the invention and shown in lowermost loading position;

Fig. 2 is a perspective view similar to Fig. 1 but showing the elevating apparatus in the upper loading position and with a wheelchair thereon;

Fig. 3 is a perspective view similar to Fig. 2,

but showing the elevating apparatus supporting a wheelchair in stored position within the van;

Fig. 4 shows diagrammatically in side elevation the track means and first and second carriage means of the elevating apparatus;

Figs. 5a and 5b show diagrammatically in side elevation the rear end of the floor plate assembly for supporting the wheelchair on the elevating apparatus, as well as the rear entry gate and operating means therefor;

Fig. 6 is a broken-away perspective view of the floor plate assembly and the adjustable safety gate towards its front end;

Fig. 7 shows diagrammatically in side elevation, partly broken away, the drive and lifting arrangements, the second carriage means being shown uppermost relative to the first carriage means, and

Fig. 8 is a similar view to Fig. 7 but showing the second carriage means in lowermost or ground-engaging position, relative to the first carriage means.

The elevating apparatus 10 shown in the drawings has first carriage means 11 and second carriage means 12, track means 13 being arranged to support the first carriage means 11 and to be mounted on a platform 14 constituted by the floor at the rear of a motor vehicle van 15. Thus, the first carriage means 11 may be moved horizontally on the van floor or platform 14 from a stored position in the van as shown in Fig. 3 to an upper loading position overlapping the free edge 16 of the platform as shown in Fig. 2. The second carriage means 12 is supported operatively by the first carriage means 11 and is mounted for vertical movement when the first carriage means is in the upper loading position of Fig. 2, whereby the second carriage means 12 can be transferred from the upper loading position

of Fig. 2 to the lower loading position shown in Fig. 1 at or adjacent the ground or other base level means such as the floor of a building into which the van 15 is driven.

It will be seen that the horizontal track means 13 includes a pair of spaced parallel tracks 17 which are conveniently of I-section having upper horizontal webs 18 under which guide rollers 19 may engage. The tracks 17 extend longitudinally of the van 15, and each track is traversed by one of a pair of cantilever beams 20 of the first carriage means 11, said beams 20 having said guide rollers 19 engaging beneath the webs 18 of the respective track 17 and another or top roller 21 engaging against the top face of the web 18 for guided motion of the first carriage means along the tracks 17. The disposition of the latter enables loading and unloading through the rear door 22 of the van 15, and it will be noted that the door 22 is of such height that a loaded wheelchair may pass in and out of the van between the positions shown in Figs. 2 and 3.

The second carriage means 12 is mounted so that it can travel vertically relative to the first carriage means 11 between the positions shown in Figs. 1 and 2 when the carriage means 11 is clear of the van platform 14, there being fixed guide frames 23 on the first carriage means 11 to co-operate with upstanding frame members 24 of the second carriage means 12, the latter having upper and lower guide rollers 25 as illustrated. The frame members 24 are thus able to move up and down in guided manner within respective upper guide channel members 26 which are themselves mounted for vertical raising and lowering in guided manner within fixed channel assemblies 27 of said fixed guide frames 23 of the first carriage means 11.

Power means are provided in the form of an electric motor 28 rigid on the first carriage means 11 and having a cross shaft 29 which at its opposite ends rotates a respective winder 30 for raising and lowering the guide

channel members 26 and their supported lower upstanding frame members 24 in a two-stage telescopic-type action. This action will be clear from Figs. 7 and 8 in particular which show the winders 30 rotatable by the motor 28 and operating a flexible lifting strap 31 which has its length extending around a fixed top pulley 32 and around a pulley 33 on the top of and movable with the guide channel member 26 before being secured at 34 near the top pulley 32. In this way, winding of the flexible strap 31 causes the pulley 33 to rise to lift the members 24 which in turn reach the uppermost position in the guide members 26 and these continue lifting together to the positions shown in Fig. 7. Any suitable guide or roller arrangements may be used between relatively movable parts and the motor 28 may be controlled by switches (not shown) including (1) an upper limit switch to prevent lifting further (2) a tension sensor switch to stop lowering actions once it has reached bottom position, and (3) a lower limit switch to stop if it has not bottomed.

It will be appreciated that the two-stage telescopic-type action as described enables the frame members 24 to be contained in the fixed guide frames 23 when the latter are of a height not substantially exceeding the designed lifting height of the members 24. The latter have their lower ends secured to one end of the horizontal rectangular floor plate assembly 35 on which the wheelchair can be supported within the lateral confines of the entire lifting apparatus. The plate assembly 35 includes parallel longitudinal side bars 36 between which an entry gate 37 extends but may be lowered as shown in Fig. 5a to permit the wheelchair to be driven thereon or raised as shown in Fig. 5b to prevent accidental removal. The gate 37 is mounted for pivotal movement about a horizontal axis 38 between the bars 36 and has a lever 39 and toggle handle 40 to be arranged as an over-centre toggle lock when the gate

37 is raised as in Fig. 5b. The end of the floor plate assembly 35 remote from the gate 37 has an adjustable safety gate 41 hinged and lockable in the same way as the gate 37 and adjustable in its distance from the gate 37, serving to provide safety for the feet of a person in the chair as well as general stability for chairs of differing lengths.

It will be apparent that the upper or first carriage assembly 11 provides support and guidance for the second carriage 12 so that both can be moved horizontally to and from the van, using manual control, but only when the two assemblies are cantilevered from the platform can the second carriage means be lowered or raised. Remote control of the motor may be effected by a switch pad 42 on an extensible cord 43, while Fig. 7 shows a manual control handle 44 which is removable but usable in an emergency in case of power failure.

While the invention will be found very effective for transporting wheelchair patients, it can obviously be used in any application where a load must be lifted from the ground or other base level arrangement and moved back along a storage level such as a vehicle platform or an elevated room of a building structure. Clearly the invention will be found extremely useful in handling electrical cable reels which must be transported to a site and then unloaded for use.

It will be understood that very many design modifications may be employed in utilising the broad idea as outlined, as well as adaptations for different applications and uses. The invention is to be understood to embrace all modifications as will be readily apparent to persons skilled in the art and residing within the scope and ambit as defined by the appended claims.

CLAIMS

1. Elevating apparatus including first carriage means and second carriage means, track means adapted to support said first carriage means and adapted to be mounted on a platform for horizontal movement of said first carriage means from a stored position on the platform remote from its free edge to an upper loading position overlapping said free edge, said second carriage means being supported operatively by said first carriage means and mounted for vertical movement relative thereto when said first carriage means is in said upper loading position, whereby said second carriage means is transferable from said upper loading position to a lower loading position at or adjacent the ground or other base level means.
2. Elevating apparatus according to Claim 1, wherein the horizontal track means includes a pair of spaced parallel tracks extending between said stored and upper loading positions, said first carriage means being mounted on guide rollers or equivalent means engaging said parallel tracks in guided relationship thereto.
3. Elevating apparatus according to Claim 2, wherein said parallel tracks are secured to a motor vehicle van floor for loading and unloading through a door thereof, such as the rear door of a van, such rear door being of a height to accommodate a loaded wheelchair for example, the latter being accommodated within the van in stored attitude when the first carriage means occupies the innermost or stored position.
4. Elevating apparatus according to any one of the preceding claims, wherein said second carriage means is mounted so that it can travel vertically relative to the first carriage means between upper and lower loading positions when the first carriage means is furthermost from the stored position, guide means being associated with the first carriage means to co-operate with rollers or other

guide means on upstanding frame members of said second carriage means.

5. Elevating apparatus according to Claim 4, wherein said upstanding frame members of said second carriage means are raisable in guided manner relative to upper guide channel members which are themselves raisable in guided manner relative to and within fixed channel assemblies on said first carriage means, power means being provided for lifting the guide channel members and their supported lower upstanding frame members in a two-stage telescopic-type action enabling the fixed channel assemblies on the first carriage means to be made to a height not substantially exceeding the designed lifting height of the said upstanding frame members.

6. Elevating apparatus according to either Claims 4 or 5, wherein said upstanding frame members of said second carriage means have their lower extremities rigidly secured to a horizontal floor plate assembly adapted to support a load to be lifted such as a wheelchair.

7. Elevating apparatus according to Claim 6 wherein said floor plate is provided with an entry gate adapted to be lowered to permit a wheelchair to be driven thereon or raised to prevent accidental removal therefrom, said gate being mounted for pivotal movement about a horizontal axis between lower and raised positions by lever means adapted to be locked by over-centre toggle means when the gate is raised.

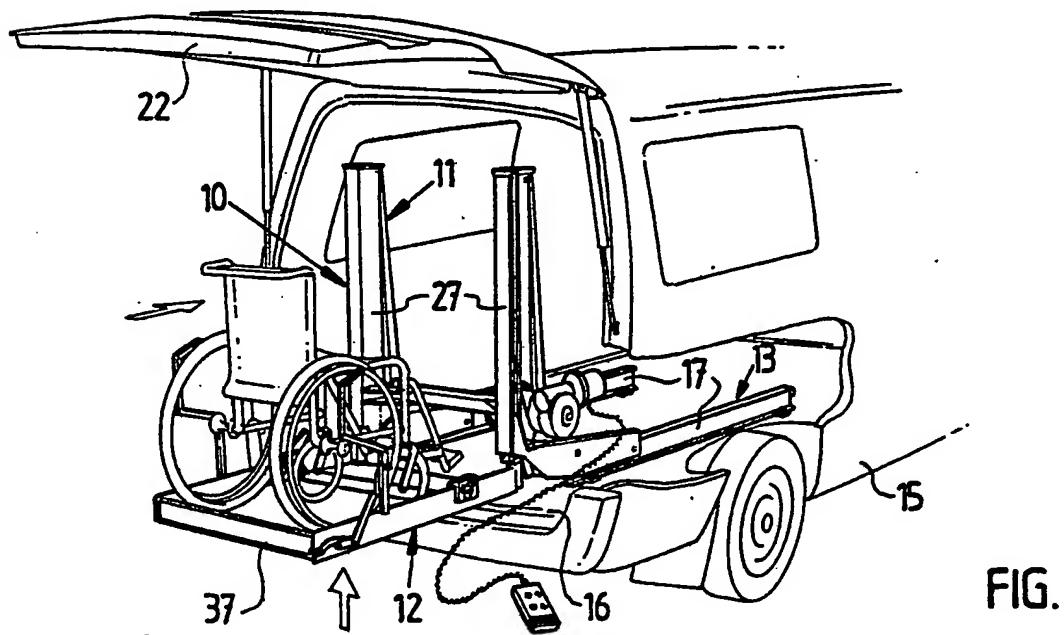
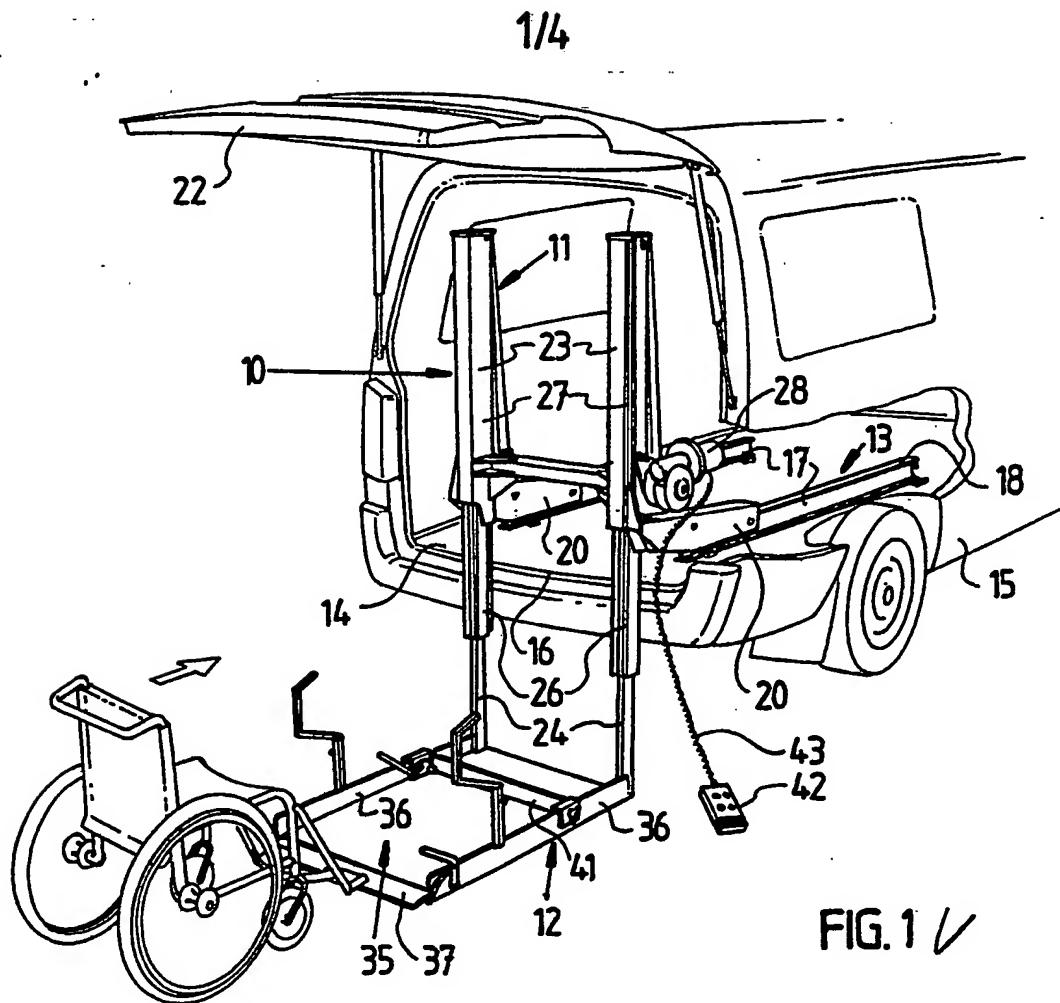
8. Elevating apparatus according to Claim 7, wherein said floor plate is provided with an adjustable safety gate towards its front remote from the entry gate.

9. Elevating apparatus according to any one of the preceding claims, wherein the first carriage means in its uppermost loading position overlaps said free edge of the

platform in a cantilevered manner to extend beyond the free edge of the platform to permit vertical movement of the second carriage means except when the first carriage means is in any position on said track means spaced from and in the direction away from said upper loading position towards said stored position.

10. Elevating apparatus according to any one of the preceding claims, wherein said second carriage means is vertically movable under the action of a motor mounted on said first carriage means and operatively connected by a flexible lifting member to the second carriage means.

11. Elevating apparatus substantially as hereinbefore described with reference to the accompanying drawings..



SUBSTITUTE SHEET

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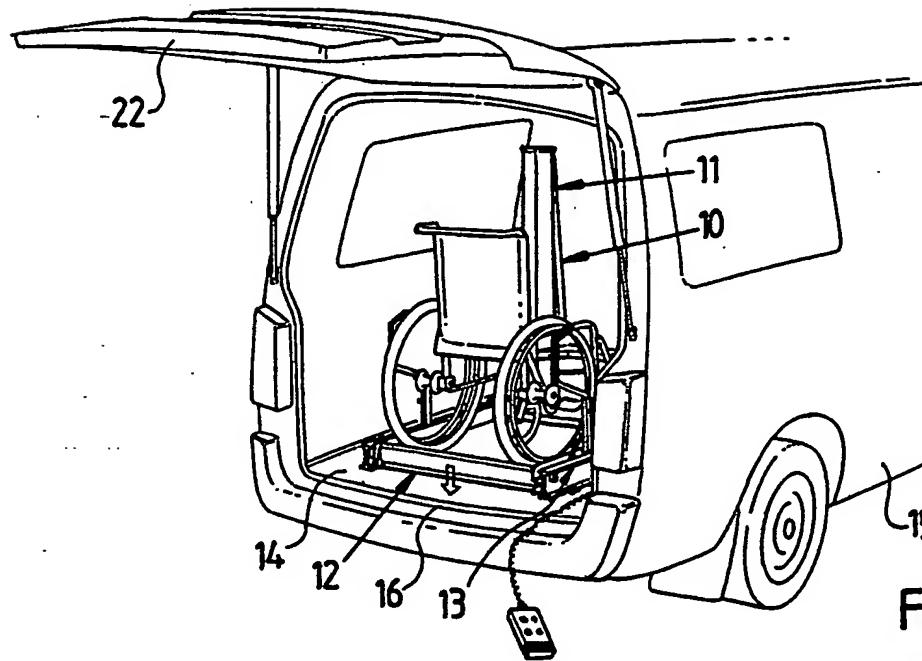


FIG. 3

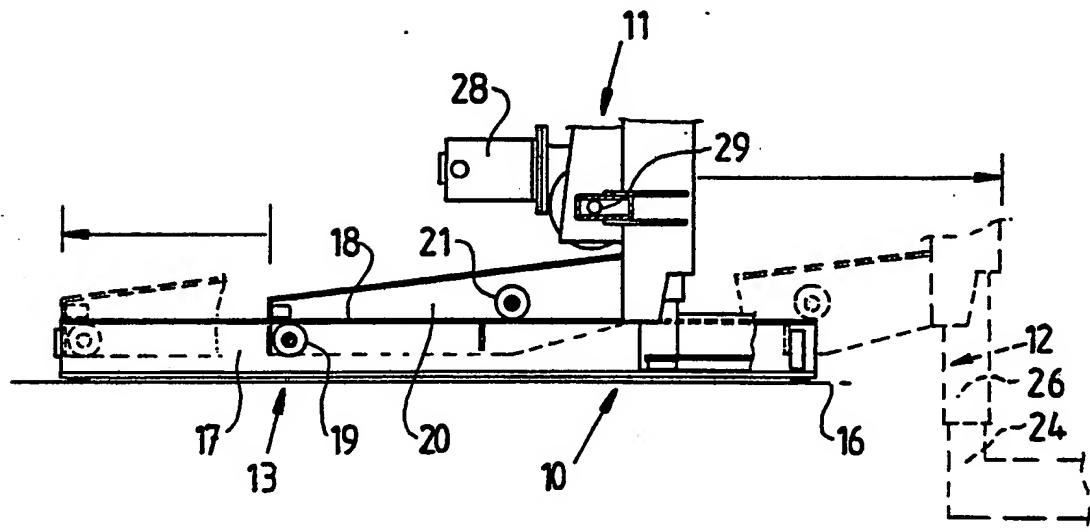
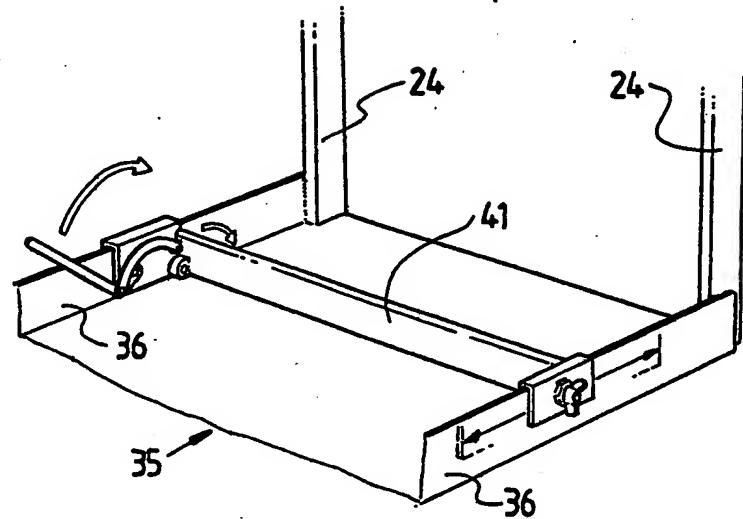
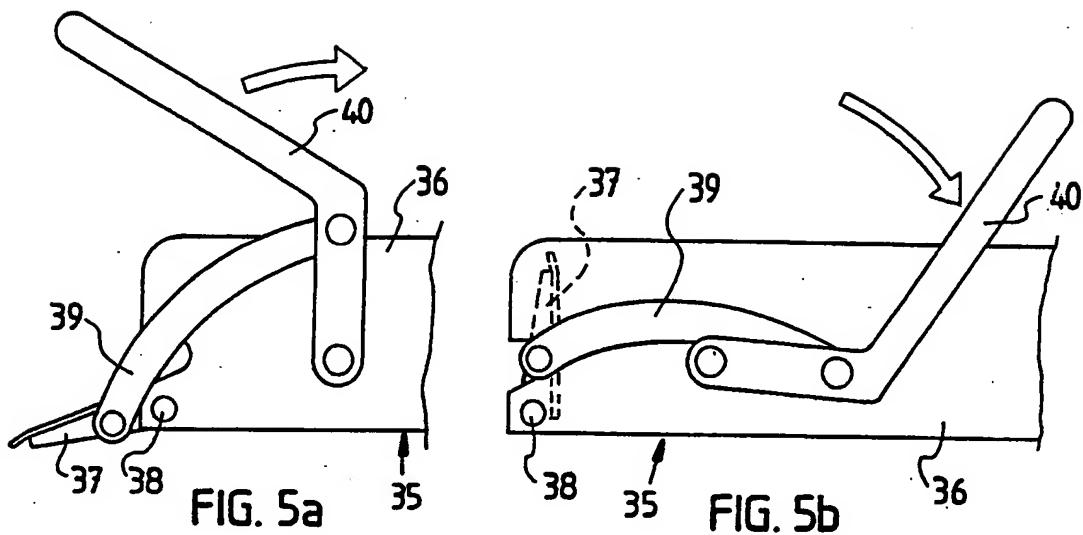


FIG. 4

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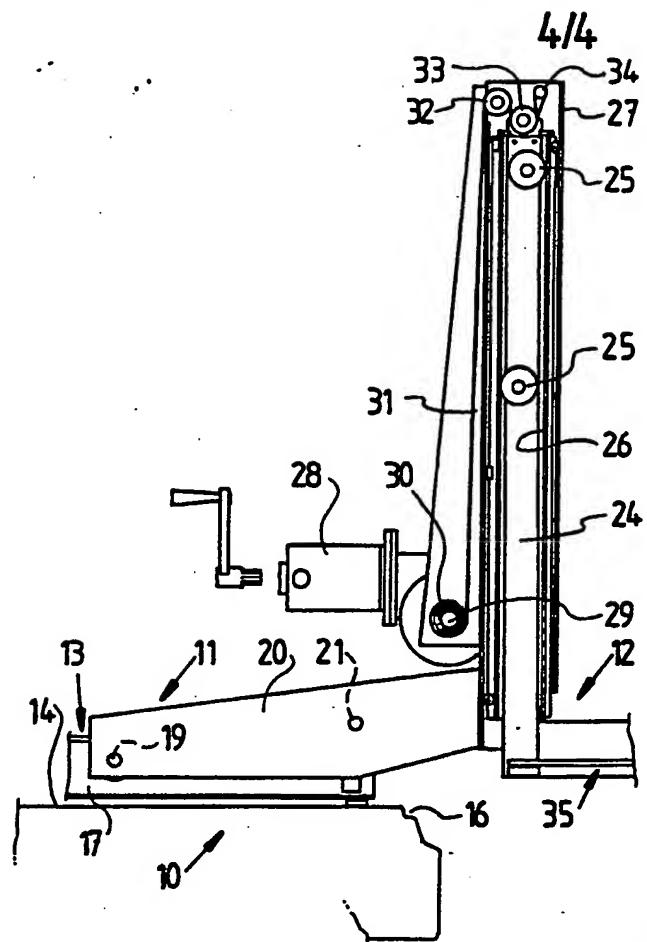


FIG. 7

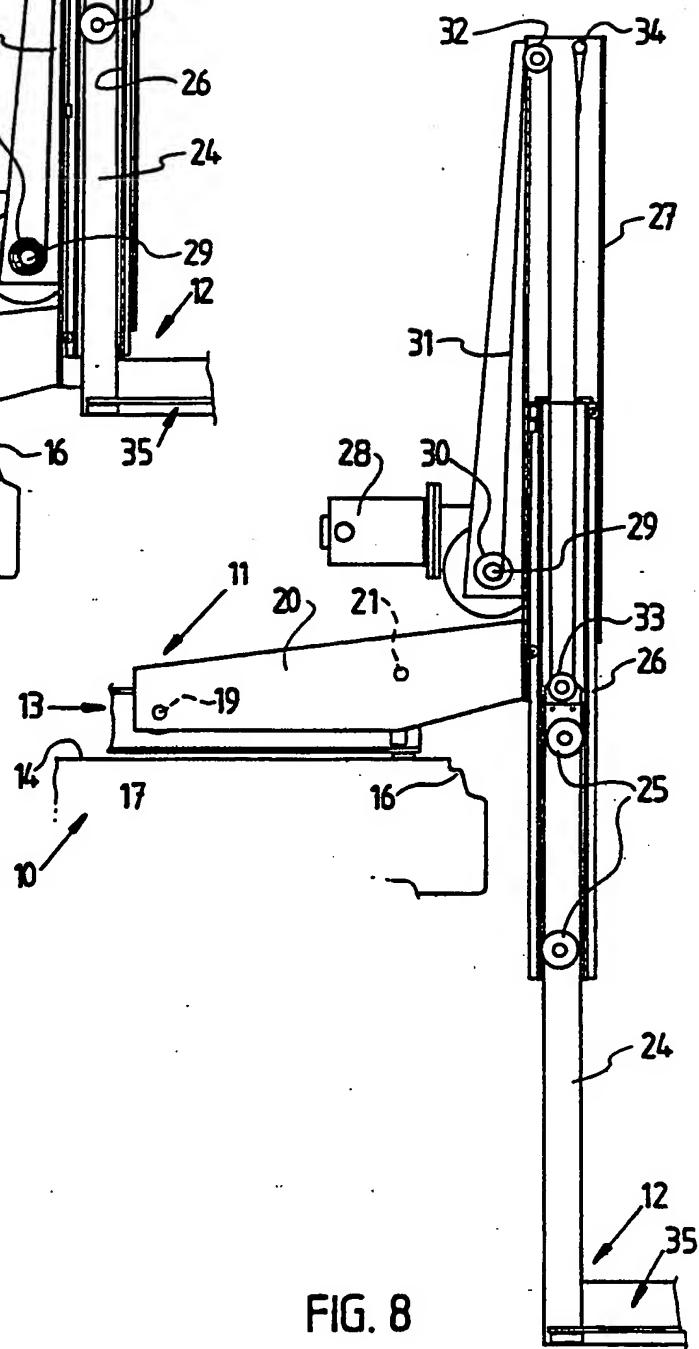


FIG. 8

INTERNATIONAL SEARCH REPORT

I. CLASSIFICATION OF SUBJECT MATTER (if several classification symbols apply, indicate all)⁶

According to International Patent classification (IPC) or to both National Classification and IPC
Int. Cl.⁶ B66F 9/04; B60P 1/46; A61G 3/06.

II. FIELDS SEARCHED

Minimum Documentation Searched⁷

| Classification System | Classification Symbols |
|-----------------------|--|
| IPC | B66F 9/04; B60P 1/46; A61G 3/06; A61G 3/00 |

Documentation Searched other than Minimum Documentation⁷
to the Extent that such Documents are Included in the Fields Searched⁸

AU: IPC as above.

III. DOCUMENTS CONSIDERED TO BE RELEVANT⁹

| Category ¹⁰ | Citation of Document, ¹¹ with indication, where appropriate of the relevant passages ¹² | Relevant to Claim No ¹³ |
|------------------------|---|------------------------------------|
| X | DE,A, 3813495 (WILLING et al.); 2 November 1989 (02.11.89); see figure 2. | (1-6, 9) |
| X | GB,A, 604441 (DEMPSTER BROS. INC); 5 June 1948 (05.06.48) see figure 1. | (1-6, 9) |
| X | GB,A, 1265312 (WILSON); 1 March 1972 (01.03.72) see figures 1-3. | (1-6, 9) |
| X | EP,A, 26510 (SOCIETE D'EXPLOITATION DES ATELIERS ANDRE RUIZ S.A., et al.); 8 April 1981 (08.04.81); see figures 1, 11, 12. | (1-5) |
| X | GB,A, 862887 (PANES); 15 March 1981 (15.03.81); see figure 1. | (1-3, 9) |
| CONTINUED | | |

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| • Special categories of cited documents : ¹⁰ | | |
| "A" Document defining the general state of the art which is not considered to be of particular relevance | "T" | Later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention |
| "E" earlier document but published on or after the international filing date | "X" | document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step |
| "L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified) | "Y" | document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art |
| "O" document referring to an oral disclosure, use, exhibition or other means | | document member of the same patent family |
| "P" document published prior to the international filing date but later than the priority date claimed | "&" | |

IV. CERTIFICATION

| | |
|--|---|
| Date of the Actual Completion of the International Search 3 March 1992 (03.03.92) | Date of Mailing of this International Search Report 18 March 1992 (18.03.92) |
| International Searching Authority AUSTRALIAN PATENT OFFICE | Signature of Authorized Officer <i>S. K. Ghosh</i> S.K. GHOSH |

FURTHER INFORMATION CONTINUED FROM THE SECOND SHEET

| | | |
|---|--|---------|
| X | GB,A, 1289604 (LONDON BRICK CO LTD); 20 September 1972 (20.09.72); see figure 1. | (1,2,9) |
| X | GB,A, 936208 (DIESEL EQUIPMENT LTD); 4 September 1963 (04.09.63); see figure 1. | (1,2) |

V. OBSERVATIONS WHERE CERTAIN CLAIMS WERE FOUND UNSEARCHABLE ¹

This international search report has not been established in respect of certain claims under Article 17(2)(a) for the following reasons:

1. Claim numbers, because they relate to subject matter not required to be searched by this Authority, namely:

2. Claim numbers, because they relate to parts of the international application that do not comply with the prescribed requirements to such an extent that no meaningful international search can be carried out, specifically:

3. Claim numbers, because they are dependent claims and are not drafted in accordance with the second and third sentences of PCT Rule 6.4a

VI. OBSERVATIONS WHERE UNITY OF INVENTION IS LACKING ²

This International Searching Authority found multiple inventions in this international application as follows:

1. As all required additional search fees were timely paid by the applicant, this international search report covers all searchable claims of the international application.

2. As only some of the required additional search fees were timely paid by the applicant, this international search report covers only those claims of the international application for which fees were paid, specifically claims:

3. No required additional search fees were timely paid by the applicant. Consequently, this international search report is restricted to the invention first mentioned in the claims; it is covered by claim numbers:

4. As all searchable claims could be searched without effort justifying an additional fee, the International Searching Authority did not invite payment of any additional fee.

Remark on Protest

The additional search fees were accompanied by applicant's protest.

No protest accompanied the payment of additional search fees.

**ANNEX TO THE INTERNATIONAL SEARCH REPORT ON
INTERNATIONAL APPLICATION NO. PCT/AU 91/00564**

This Annex lists the known "A" publication level patent family members relating to the patent documents cited in the above-mentioned international search report. The Australian Patent Office is in no way liable for these particulars which are merely given for the purpose of information.

| Patent Document Cited In Search Report | | Patent Family Member | | | |
|---|---------|-----------------------------|--------------------------|-------------------------|--|
| DE | 3813495 | | | | |
| GB | 604441 | | | | |
| GB | 1265312 | BE 729094 FR 2003024 | DE 1910220 NL 6903200 | ES 364687 US 3602385 | |
| EP | 26510 | ES 495049 | FR 2464065 | | |
| GB | 862887 | DE 1145098 | US 2969157 | FR 1238626 | |
| GB | 1289604 | | | | |
| GB | 936208 | | | | |